NICE or nasty ?
UTI in childhood

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The apparent problem

- 3% girls and 1% boys are affected… or more
- Approx one-third have an underlying anomaly
- VUR is the commonest anomaly found
- VUR and infection are associated with renal scars (Smellie, Hodson, Ransley and Risdon et al)

  SO
- Prevention of infection will prevent scars and prevent the sequelae of scars ie ESRF

1991 Consensus guidelines - Working Group of the Research Unit of RCP

- Following proven infection, all children should be investigated
  - < 1 yo: u/s, MCUG and DMSA
  - 1-7 yo : u/s and DMSA
  - > 7 yo : u/s only
- Low dose trimethoprim an integral part of management

- So why do we need a new NICE guideline ?

The real problems

- Diagnosing UTI with certainty
- Do scars really matter ?
- What is the age limit for developing scars ?
- Can scars really be prevented ?
- Emphasis on looking for VUR - change in picture following introduction of good antenatal scanning
- Variability in compliance with 1991 guideline

How many children have scarring ?

- Many children have normal investigations
- Deshpande and Verrier-Jones, Archives of Disease in Childhood 2001
  - DMSA showed ‘scarring’ in 11%
    - 22% of those admitted
    - 1% of those not admitted
- Coulthard et al BMJ 1997
  - DMSA showed parenchymal defects in 4.7% girls and 4.3% boys after first infection

Do scars really matter ?

- Reflux nephropathy is the commonest reason for renal transplantation in childhood in UK

- If nephropathy is acquired we must do all we can to identify those at risk and prevent further UTI

The cost of reflux nephropathy

Smellie et al Ped Nephrol 1998;12:727-36

226/236 children with VUR + UTI reviewed after 10-35y 85 scars

- 15 - HT (14 scars)
- 19 - Creat raised/ULN (all scars)
- 17 (7.5%) HT and/or impaired renal fn
- 15/17 predictable

Is there an age above which scarring doesn't occur ?

- Numerous studies, different results
- Problems of 'gold standard', observer variation, and certainty about age of first infection
  - Led to variable adherence to 1991 guideline

Is there an age above which scarring doesn't occur ?

- Incidence of scarring decreases with age at first infection

  <1y 65%, 1-5y 48%, >5y 21%

  Gleeson and Gordon Arch Dis Ch 1991;66:1282-3

- Incidence of scarring does not change with age at first infection

  <1y 43%, 1-5 y 84%, >5y 80%

  Benador et al Lancet 1997;349:17-19

Are scars really preventable ?

- Surgery and medical management are of equivalent efficacy

  IRSC and Birmingham reflux study

IRSG EurJPediatr 1998;157:753-8

BRSG BrMedJ1987;295:237-241

- <u>But</u> no good evidence on efficacy of prophylaxis – yet - meta-analysis shows no effect on recurrence of symptomatic UTI or development of further scars

Are scars really preventable ?

Dysplasia vs scarring

- Some kidneys are dysplastic, rather than scarred
  - Risdon Ped Nephrol 1987
- Some ‘scars’ are seen in the absence of VUR
  - Jakobsson et al Archives of Disease in Childhood 1992
- Increasing recognition of antenatal hydronephrosis and VUR +/- dysplasia
  - Yeung et al BJU 1997

Are scars really preventable ?

- ‘Big bang theory and intrarenal reflux’

  Ransley + Risdon Urol research 1975;3:105-9

  Ransley + Risdon Kidney International 1981 733-42

- So looking for VUR may be shutting the stable door after the horse has bolted

Why are we investigating ?

- Identifying scars may be useful
- Pretending we will identify conditions which we can alleviate so that we can prevent further scarring is probably not realistic
- Age is possibly less useful than other factors in picking out those at risk
- Lots of units have modified the 1991 guidelines based on local strengths/weaknesses and prejudices

NICE guidelines

- Mixture of evidence and consensus
- Focus on low index of suspicion and accuracy of diagnosis for identifying UTI
- Emphasis on selective investigation of those at most risk, with fewer investigations overall

Diagnosis

- Collect urine specimens in infants or children with unexplained fever > 38°c
- Or signs or symptoms suggestive of urine infection
- Consider likelihood of moderate or serious illness
- Collect urine by clean catch
  - Alternatives pad (bag) or u/s guided SPA

Diagnosis – dipstick or microscopy ?

- Nitrites : low sensitivity 16-88 %, high specificity 75-100 %
- LE : Wide ranges of both sensitivity and specificity (in general comparable sensitivity but less specific)
- LE and Nit positive : Highest LR +
- Either negative : High LR -
- Results < 2 years old less reliable

Diagnosis – dipstick or microscopy ?

- Microscopy can be used for pyuria and bacteriuria
- Presence or absence of bacteriuria more helpful than presence or absence of pyuria
- In general, absence of pyuria or bacteriuria better than dipstick at ruling out UTI
- But.. problem of availability

Dipstick or microscopy ?

Age	Action
< 3 months	URGENT micro in hospital
3 months- 3 years	Micro : URGENT unless no specific symptoms and low risk of serious illness Via hosp referral is high risk serious illness Start treatment if urgent micro positive, or if not available and specific symptoms or intermediate risk of serious illness (consider dipstick)
> 3 years	Dipstick

Interpretation of microscopy

Microscopy results

	Pyuria positive	Pyuria negative
Bacteriuria positive	The infant or child should be regarded as having UTI	The infant or child should be regarded as having UTI
Bacteriuria negative	Antibiotic treatment should be started if clinically UTI	The infant or child should be regarded as not having UTI

Interpretation of Dipstick

Children 3 years or older	Use dipstick test to diagnose UTI
If both leukocyte esterase and nitrite are positive	• Start antibiotic treatment for UTI. • If high or intermediate risk of serious illness or past history of UTI, send urine sample for culture.
If leukocyte esterase is negative and nitrite is positive	• Start antibiotic treatment if fresh sample was tested. • Send urine sample for culture.
If leukocyte esterase is positive and nitrite is negative	• Send urine sample for microscopy and culture. • Only start antibiotic treatment for UTI if there is good clinical evidence of UTI. • Result may indicate infection elsewhere. • Treat depending on results of culture.
If both leukocyte esterase and nitrite are negative	• Do not start treatment for UTI. • Explore other causes of illness. • Do not send urine sample for culture unless recommended in 'Indications for culture'.

Indications for culture

- Age < 3 yo
- Single positive LE or nitrite
- Suspected upper tract infection
- High or intermediate risk serious illness
- Recurrent UTI
- Failure to respond to treatment within 24-48 hours
- Symptoms and dipstick do not correlate

Management

- < 3 months or high risk serious illness, refer for admission, iv treatment
- Pyelonephritic illness aged > 3 months

  oral 7-10 days or iv 2-4 days then oral to total 10 days
- Lower tract – oral for 3 days, reassess at 24-48 hours if still unwell and send specimen for culture

What happens next ?

- Routine prophylaxis after first infection is not recommended
- May be considered after recurrent infections
- Encourage high fluid intake, regular voiding and address any voiding issues (etc)

- What about investigations ?

Investigations

Test	Looks for	Invasiveness	Radiation (CXRs)	Cost
u/s	Structure		0	£ 50.20
MCUG	VUR	+++	120	£ 195.86
MAG3 voiding	VUR(continent)	+	110	£ 249.68
DMSA	Scars	+	80	£ 127.78

Investigations

- Focus investigations on
  - < 6 months old – higher risk structural or obstructive abnormalities
  - Recurrent UTI – higher risk of parenchymal defects with recurrent upper tract UTI
  - Atypical UTI- higher risk of structural abnormalities or parenchymal defects

Atypical UTI

- Seriously unwell
- Septicaemia
- Raised creatinine
- Poor urine flow
- Abdominal mass
- Failure to respond within 48 hours
- Non E Coli infections

Recurrent UTI

- Two or more episodes upper tract
- One upper tract plus one or more lower tract
- Three or more lower tract

Imaging < 6 months

	Responds within 48 hours	Atypical	Recurrent
Acute u/s		Yes	Yes
u/s within 6 weeks	Yes		
DMSA 4-6 months		Yes	Yes
MCUG		Yes	Yes

Imaging 6 months – 3 years

	Responds within 48 hours	Atypical	Recurrent
Acute u/s		Yes	
u/s within 6 weeks			Yes
DMSA 4-6 months		Yes	Yes
MCUG			

Imaging > 3 years

	Responds within 48 hours	Atypical	Recurrent
Acute u/s		Yes	
u/s within 6 weeks			Yes
DMSA 4-6 months			Yes
MCUG			

Who should be referred ?

- Acutely < 3 months or seriously unwell
- OP referral < 6 months

  ? Others who justify imaging

  ? Others who continue to recur

  Those with abnormal imaging

Is everyone happy ?

- No !
- But mostly …

Any questions ?